

California Department
of
Transportation

Tenth Biennial Report
to the
California State Legislature

Prepared Pursuant to
Government Code Section 14051

January 2011

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Preface

Government Code section 14051 requires the California Department of Transportation (Department) to prepare and submit a report to the California State Legislature (Legislature) at the beginning of each regular session. Following publication of the Fourth Biennial Report in January 1991, the Legislature passed two bills suspending the report as a cost-cutting measure. In Fiscal Year (FY) 1999-00, the Assembly Transportation Committee introduced AB 2908 which proposed the elimination of the Biennial Report; however, the bill failed passage and the requirement for the preparation of this report was reinstated with the publication of the 2001 Biennial Report.

Additionally, in 2004 AB 79 (Dutra) was enacted into law (Chapter 409 Statutes of 2004). This measure suspends certain reports to the Legislature until January 1, 2008. However, this measure specifically requires the continued preparation of the Biennial Report.

Accordingly, as required by law, this status report covers specific areas of the Department's program activities as follows:

- Excess real property disposal.
- Freeway noise abatement in schools.
- State assent to federal statutes, rules, and regulations.
- Significant air transportation issues.
- Alternative technologies in transportation.
- Alternatives to fossil fuels.

In addition, a brief summary on non-motorized transportation has also been included, although the requirement for this report was repealed several years ago. For more information on these and other activities, the reader is referred to the Department's publication entitled "The California Department of Transportation Journal."

Government Code Section 14051

14051 (a) At the commencement of each regular session of the Legislature, the Department shall submit to the Legislature a report summarizing information required under, and programs authorized by, Sections 118.6, 216, and 820 Article 3.5 (commencing with Section 156) of Chapter 1 of Division 1 of the Streets and Highways Code, and

- (b) Information on other program activities may be included in the biennial report at the discretion of the Department.
- (c) The report required by this section shall also include all of the following:
 - (1) An evaluation of significant air transportation issues anticipated to be of public concern during the five-year period commencing January 1 of the year preceding the date for submission of the report and beyond.
 - (2) Recommended modification to state and federal law, where appropriate.
 - (3) An overview of necessary future investments in the development and maintenance of the state's air transportation system.
 - (4) An analysis of the Department's organizational and staff needs relative to its air transportation responsibilities.
 - (5) A review of state's aeronautics policy.

In preparing the portion of the report required by this subdivision, the Department shall fully consider and incorporate air transportation needs as identified by local government and the private sector, as well as the need to fully integrate air transportation issues and concerns into the mission of the Department.

- (d) The report required by this section shall also include all of the following:
 - (1) The status of alternative technologies in transportation, including, but not limited to, the efforts made in research development. The alternative technologies reported on shall seek to improve public safety, energy efficiency, and air quality.
 - (2) Alternatives to fossil fuels to power transportation devices, including alternative methods of propulsion of motor vehicles.

Executive Summary

This is the Tenth Biennial Report to the Legislature under the provisions of Government Code section 14051. The Government Code has very specific reporting requirements covering the Department's activities. This report is organized into seven sections summarizing the information required by statute. The required items, as well as the non-motorized transportation, listed in the same order as the language used in the Government Code, are summarized below:

Excess Real Property Disposal (Streets and Highways Code section 118.6)

Streets and Highways Code section 118.6 requires the Department to sell or exchange real property determined to be excess. As of June 30, 2009, the Department's inventory of excess lands contained 967 parcels, with 278 available for sale. For the fiscal year ending June 30, 2009, excess lands sales, totaling 570 parcels, have produced \$26,923,391 in revenues. The value of these parcels at acquisition was \$5,234,252, thus netting \$21,689,139.

Freeway Noise Abatement in Schools (Streets and Highways Code section 216)

The Streets and Highways Code requires the Department to abate freeway traffic and construction noise that may affect school classroom learning environments. This program is limited to interior noise levels in classrooms only. Sound walls are for outdoor areas and comply with federal codes and use federal funds. In the Fourth Biennial Report (1991), the Department reported abatement measures had been completed for 116 schools. As reported in the Sixth Biennial Report (2003), this number has now risen to 122 schools and is substantially complete. However, this program is still active adding one additional school in the last two fiscal years bringing the total to 123 schools. Additional schools may qualify as traffic, and subsequently noise, increase.

State Assent to Federal Statutes, Rules and Regulations (Streets and Highways Code section 820)

The State of California assents to Federal statutes, rules and regulations. Streets and Highways Code section 820 deals with the conflicts between State and federal law in cooperative highway work with funds apportioned by the federal government. The report explains how these conflicts have been resolved. Only one issue has been identified. California is not in compliance with federal law regarding driving under the influence. As a result, since the federal fiscal year (FFY) 2001, \$441 million of the federal highway funds have been transferred to the California Office of Traffic Safety (OTS). Of the \$441 million, approximately half has come to the Department for safety improvement projects.

Non-motorized Transportation (Streets and Highways Code section 156.7)

The reader is directed to the "*Non-Motorized Transportation Facilities Report*," an annual report to the Legislature required by the Streets and Highways Code section 887.4. The report is available from the Bicycle Facilities Unit in the Department's Division of Local Assistance.

Significant Air Transportation Issues (Government Code section 14051(c)(1)-(5))

The Department's Division of Aeronautics (Aeronautics) is primarily involved with the general aviation component of air transportation. The goal in aviation is to foster and promote the development of a safe, efficient, dependable, and environmentally compatible air transportation system. The State Aeronautics Act, Public Utilities Code (PUC) section 21001 et seq., is the foundation for the State's aviation policies. Vision 100-Century of Aviation Reauthorization Act (2003), reauthorized programs for the Federal Aviation Administration (FAA) including the Airport Improvement Program (AIP) which funds the bulk of capital improvements at the nation's airports. Reauthorization has not happened since 2003, but funding has been continued at Vision 100 levels many times since 2007. During FY 2009-10, Aeronautics staff worked with the Transportation Research Board's Airport Cooperative Research Program and the Division of Research and Innovation (DRI) on aviation weather systems, airport pavement, aviation capacity and environmental issues.

Alternative Technologies (Government Code section 14051(d)(1))

This section provides a status report on the development of alternative technologies in transportation. The DRI is charged with stimulating innovation in transportation by performing applied, customer-focused research that yields tangible products and process enhancements to improve mobility across California. The DRI's primary responsibility is to coordinate the Department's research development process and to more effectively conduct and deploy research that meets the needs of internal and external customers. The technology improvements included in this report are for projects that seek to improve mobility, public safety, energy efficiency, and air quality.

Alternative to Fossil Fuels (Government Code section 14051(d)(2))

The Department is active in innovative research and demonstration projects involving alternative fuels. Most departmental energy conservation goals should be attainable by 2015 as authorized by the issuance of executive orders in 2004, 2005, and 2006, increasing the outreach of energy and environmental programs. The Department uses E85 (85 percent ethanol and 15 percent unleaded gasoline) capable vehicles and operates fueling sites at strategic locations in the state. The Department also operates Compressed Natural Gas (CNG) fueled sweepers and heavy duty trucks in areas where fuel is available. The results of a recent study of biodiesel with the University of California, Riverside have been utilized to implement biodiesel in its bulk fuel sites. Approximately 90 percent of the Department's bulk fuel sites are dispensing biodiesel.

EXCESS REAL PROPERTY DISPOSAL¹

Section 118.6 of the Streets and Highways Code requires the Department, to the greatest extent possible, to sell or exchange real property within a year from the date the Department determines it to be excess. Excess land is property no longer needed for highway or other public purposes. It may be created by purchase, design change, route rescission, abandonment of maintenance or material sites, or decertification. Current Department policy requires the disposal of excess real property consistent with the intent of the law and good business practices.

As of June 30, 2009, the Department's inventory of excess land contained 967 parcels, with 278 available for sale. For the fiscal year ending June 30, 2009, excess land sales, totaling 570 parcels, have produced \$26,923,391 in revenue. The value of these parcels at acquisition was \$5,234,252, thus netting \$21,689,139. The following chart depicts excess land sales approved by the California Transportation Commission (CTC) or by the Department and removed from inventory during FY 2008-09.

Excess Land Sales – FY 2008-09

District	Total Parcels	Value at Acquisition	Sales Revenue
1	6	\$ 581,714	\$ 265,550
2	5	\$ 343,417	\$ 7,301
3	22	\$ 196,981	\$ 568,306
4	180	\$ 3,162,592	\$ 10,276,918
5	32	\$ 13,831	\$ 154,735
6	27	\$ 162,625	\$ 603,170
7	116	\$ 344,177	\$ 4,852,590
8	76	\$ 46,458	\$ 7,001,300
9	11	\$ 3,189	\$ 8,866
10	2	\$ -	\$ 3,600
11	73	\$ 379,268	\$ 549,555
12	20	\$ -	\$ 2,631,500
TOTAL	570	\$ 5,234,252	\$ 26,923,391

The column "Value at Acquisition" in the chart above represents the value of parcels when they are acquired by the Department as separate parcels, usually a remnant of a much larger piece of property. The dollar value shown is the pro-rata share of the larger property. Also, some parcels of excess land may have been held for decades and the values may have appreciated significantly by the time the remaining portions are sold. Occasionally, property is disposed of by conveying parcels to another entity as part of a cooperative agreement. In these cases, the numbers could show either a sharp decline or a substantial increase in the Sales Revenue column. (For example, see Districts 1 and 2 for declines, other districts have increases).

¹ For further information on this subject, please contact the Department's Division of Right of Way.

FREEWAY NOISE ABATEMENT IN SCHOOLS²

Streets and Highways Code section 216 requires the Department to abate freeway traffic and construction noise within school classrooms under certain circumstances. This statute is intended to provide classroom-learning environments that are free of excessive freeway traffic noise or freeway construction noise. Classrooms at public or private elementary or secondary schools are generally eligible for noise abatement measures when freeway traffic or construction noise levels exceed a one-hour Leq of 52 dBA. Leq is the equivalent steady-state sound that represents an average of the sound energy occurring over a specified period. The abbreviation dBA is used to describe the method that measures sound similar to the way the human hearing system responds.

To be eligible for freeway noise abatement, classrooms, libraries, multipurpose rooms, or other spaces used for pupil personnel services, must be used for the purpose for which they were constructed and must have been built either:

- Prior to the award of the initial construction contract for the freeway route and prior to January 1, 1974.
- Subsequent to the construction of the freeway route but prior to any alteration or expansion of the freeway, this results in a significant and perceptible increase in ambient noise levels in the rooms or spaces.

If the construction of the freeway would cause hourly noise levels within the classroom to exceed 52 dBA Leq, then temporary or permanent noise abatement measures must be in-place prior to that construction, or as soon as practicable thereafter. The abatement must reduce the traffic or construction noise to below 52 dBA Leq hourly level. However, if pre-construction noise levels, including non-freeway noise sources, exceed 52 dBA Leq, then abated noise levels must be reduced only to the pre-construction level. Allowable abatement measures include, but are not limited to, installing acoustical material, replacing or eliminating windows, installing air conditioning, or constructing sound-baffling structures.

In the 2003 Biennial Report, the Department reported that noise abatement measures had been completed at 122 schools at a cost of \$23,548,000. Statewide, the program has been substantially complete since the late 1980s with only one additional project funded within the last two fiscal years. This brings the current total to 123 schools at a cost of \$24,548,000. As traffic increases on State freeways, resulting in higher noise levels in the future, additional schools might qualify for noise abatement under this program.

² For further information on this subject, please contact the Department's Division of Environmental Analysis.

STATE ASSENT TO FEDERAL STATUTES, RULES, AND REGULATIONS³

Section 164 of Title 23, United States Code (USC), requires a state to have, and enforce, a repeat intoxicated drivers law that: (1) suspends the driver's license for the second and future convictions, (2) impounds or disables all vehicles registered to the offender or places interlock devices on the vehicles, (3) requires mandatory jail time and/or community service, and (4) also requires evaluation for severity of alcohol abuse. Without compliance, beginning with the Federal Fiscal Year (FFY) 2000 1.5 percent of the Federal Interstate Maintenance, National Highway System and Surface Transportation Program funds are transferred to the OTS, increasing to 3 percent per year in FFY 2003 and beyond.

The State of California does not conform to federal law. Federal law requires a mandatory one-year license suspension for the second offense, while California law allows discretion for the second offense such as allowing the driver to maintain a restricted license for employment purposes, and a mandatory three-year suspension for the third conviction. The federal law also requires either the impoundment of all vehicles registered to the offender or an ignition interlock system be placed on the vehicles. California law only impounds the vehicle used during the offense and provides discretion, under certain circumstances, to waive impoundment. The Federal Highway Administration (FHWA) has notified the State of California that it is not in compliance with Section 164 of Title 23, USC. As a result, since the FFY 2001, \$441.4 million in federal highway funds have been transferred to the OTS.

Currently, there are only two ways California can avoid being penalized for non-compliance. Either federal law has to be changed to allow states to meet the intent of the law, or state law needs to be changed to meet the letter of federal law. While Section 164 requires federal funds to be transferred to the OTS for activities meant to curb driving by intoxicated persons, it does allow these transferred funds to be used for the Department's Hazard Elimination Safety (HES) projects under Section 152 of Title 23 USC. In 2005, the passage of the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) expanded the HES program by creating a new core program entitled "Highway Safety Improvement Program" (HSIP). This measure permits the use of federal funds transferred under Section 164 to the OTS for HSIP projects.

The following amounts were transferred to the OTS in the FFY indicated; \$22.4 million was transferred in FFY 2001; \$27.3 million in FFY 2002; \$45.6 million in FFY 2003; \$60.0 million in FFY 2004; \$56.2 million in FFY 2005; \$51.1 million in FFY 2006; \$54.6 million in FFY 2007; and \$57.8 million in FFY 2008; \$58.2 million in FFY 2009 and \$8.2 million in FFY 2010. These transfers total \$441.4 million.

³ For further information on this subject, please contact the Department's Division of Environmental Analysis.

NON-MOTORIZED TRANSPORTATION⁴

This section has been included in previous editions of the Biennial Report, although the law requiring this section was repealed in 1993. The reader is therefore directed to “*The Non-motorized Transportation Facilities Report*,” an annual report to the Legislature authorized by the Streets and Highways Code, section 887.4.

Since the preparation of the Eighth Biennial Report, the Department has been engaged in preparation of the Strategic Highway Safety Plan (SHSP). The SHSP includes 15 specific challenge areas for improving transportation safety. Non-motorized transportation is addressed specifically in challenge areas concerning walking, bicycling, and other areas that affect these modes, such as work-zone safety. Each challenge area developed strategies for improving safety in its area of emphasis.

The Department administers a number of funding programs that benefit non-motorized travelers, such as the Bicycle Transportation Account, state and federally funded programs for improving safety on routes to school, Transportation Enhancement Activities, and the Environmental Enhancement and Mitigation program.

The Department coordinates and attends meetings of the California Bicycle Advisory Committee, the Active Transportation Livable Communities Working Group, the California Blueprint for Bicycling and Walking Implementation Steering Committee, and the California Pedestrian Advisory Committee.

The Department has been engaged in a major effort to revise Deputy Directive (DD)-64 policy concerning non-motorized accommodations on state highways. The revision is focused on incorporating Complete Streets concepts into the directive. The current version of DD-64 has been recognized nationally as a Complete Streets policy.

The Department provides financial sponsorships for bicycle commuting, promotions, the Tour of California bicycle race, and the biennial Walk/Bike California Conference. The Department also participates in Million Mile Month and the Bike to Work Campaign.

⁴ For further information on this subject, please contact the Department’s Division of Local Assistance.

SIGNIFICANT AIR TRANSPORTATION ISSUES⁵

Significant General Aviation Transportation Issues

The Department's mission in aviation is to foster and promote the development of a safe, efficient, dependable, and environmentally compatible air transportation system. The State Aeronautics Act, Public Utilities Code section 21001 et seq., is the foundation for the Department's aviation policies and regulations.

The goal of Aeronautics is to annually inspect each of the 249 public-use airports and 150 hospital heliports. In addition, there are approximately 65 special-use airports and 350 special-use heliports that have state operating permits. Aeronautics also makes recommendations regarding the safety of proposed school sites within two miles of an airport runway and authorizes helicopter landings and departures on or near schools (K-12). Aviation system planning and environmental staff review proposed land uses at airports and their adjoining communities and comment on their possible impacts to the public and airport operations. Aeronautics also administers noise standard regulations for designated California airports. Grants and loans are also provided to cities, counties, airport districts, and airport land use commissions for airport development, maintenance, and planning purposes.

The California Aviation System Plan serves as a resource guide and business plan for the Division. In developing this document, the following principles were used: continuously improving system safety at the airport level for users and workers; improving general aviation throughput; maintaining or expanding airport and system capabilities; improving delivery of products and services; promoting compatible land uses around airports; and preserving previous system investments. Aeronautics continues to participate in national-level research projects through the Transportation Research Board's Airport Cooperative Research Program and has worked with the Department's Division of Research and Innovation (DRI) on various research projects.

A. Land Use and Planning Around Airports

The aviation system in California is a vital economic resource and must be preserved, maintained, and developed for future generations. Many airports that were once located in fairly remote areas see encroachment due to incompatible land use as the greatest threat to enhancing airport capability and safety.

Regional planning agencies work with airport owners and Aeronautics to develop a Regional Transportation Plan (RTP) to ensure that aviation elements are included in the plan. The RTP is the mechanism that facilitates coordination of all transportation-related planning within a region. An RTP outlines regional goals and transportation improvements to be implemented in a region over the next 20 years. Some Metropolitan Planning Organizations develop a Regional Aviation System Plan within their RTPs. It is critical that airport land use decisions be based on health and safety concerns and realistic forecasts for airport growth.

⁵ For further information on this subject, please contact the Department's Division of Aeronautics.

B. State Aeronautics Account Funding

The State Aeronautics Account is the funding source for the Division of Aeronautics and the programs it administers. The Aeronautics Account revenue sources include an 18-cent per gallon motor vehicle fuel excise tax on general aviation gasoline (Avgas) and a two-cent per gallon excise tax on general aviation jet fuel. Air carrier, military aircraft and aviation manufacturing are exempt from the two-cent per gallon excise tax on jet fuel. In FY 2008-09, Avgas revenues of \$2.0 million and jet fuel revenues of \$5.3 million were transferred into the State Aeronautics Account.

Annual revenues in the State Aeronautics Account have steadily decreased over the last ten years. For FY 2009-10, total revenues in the account were \$5,188,350, a 27.9 percent decrease in funding from the previous FY. This is the lowest funding level since FY 1998-99. Between FY 1998-99 and FY 2006-07, the Avgas revenue increased by 18 percent, while the jet fuel revenue decreased by 25 percent.

Assembly Bill X4 10, a transportation budget trailer bill signed into law in July 2009, required a transfer of \$4.0 million out of the Aeronautics Account to the State's General Fund. The bill also suspended the Division's three grant programs for FY 2009-2010. Grants that were approved prior to signing of the trailer bill were honored.

C. Vision 100 Reauthorization

Federal airport infrastructure investment from the FAA is critically important for the State's airport owners in their efforts to maintain and improve their facilities. In 2003, Congress passed the Vision 100-Century of Aviation Reauthorization Act for FAA programs. Passage of the Act included four years of Airport Improvement Program (AIP) funding levels to financially support the bulk of safety and capital improvement projects at airports throughout California and the country.

The last fully funded fiscal year for AIP was FFY 2007 at \$3.7 billion dollars. Since then this amount has been annually appropriated through a series of extensions lasting two to six months. The most recent extension was enacted in August 2010 and will expire on September 30, 2010. These funds enable airports to move forward with important safety and capacity projects.

Despite occasional economic slumps and terrorist activities, all facets of aviation, including commercial airline enplanements, business and recreational aviation, charters, and air cargo continue to see overall growth. Our nation's airports and air traffic control systems face traffic levels by both general aviation and commercial airlines that often challenge their capacities. Some major airports face capacity constraints. Without continued investment in upgrades to airport infrastructure, through FAA and state funding, the system will experience costly delays and cancellations, constraints, and consumer complaints.

General aviation investments should also be protected. General aviation has proven to be a powerful economic engine for community development as it makes transportation connections on a global scale. The number of general aviation aircraft has increased over time along with their technical sophistication that enhances safety and energy efficiency. Public-use general aviation airports also play an indispensable role in separating their operations from those of the fast and heavy commercial service airport operations. Commercial service and general aviation airports support each other by separating their vastly different types of operations.

ALTERNATIVE TECHNOLOGIES IN TRANSPORTATION⁶

The purpose of the Department's Division of Research and Innovation (DRI) is to stimulate innovation in transportation by performing applied, customer-focused research that yields tangible products and process enhancements to improve mobility across California. It is DRI's responsibility to coordinate the Department's research development process and to more effectively conduct and deploy research that meets the needs of internal and external customers.

DRI, in partnership with academia, the private sector and local, regional, state, and federal governmental entities, works to research, develop, test, demonstrate, evaluate and support deployment of innovative technologies and methodologies in transportation. Research focuses on advanced technologies that enhance performance, increase reliability, and improve safety and efficiency of the multimodal transportation system. This effort includes research that will improve operating, maintaining, and managing the system to enhance public safety, energy efficiency, and environmental stewardship, including air quality.

A. Public Safety

The Department is conducting research projects on improving public safety. These projects range from preventing collisions at intersections and railroad/highway crossings to removing snow more effectively. Examples are:

1. Safe and Efficient Travel through Innovation and Partnerships for the 21st Century (SafeTrip-21) – The SafeTrip-21 Initiative, sponsored by the U.S. Department of Transportation (USDOT), seeks to explore and validate the benefits that can be derived by providing travelers, drivers and transit and commercial motor vehicle operators with real-time information, navigation, communication, and electronic payment and other services in integrated, operational, urban and rural settings. This research will result in improvements in safety, mobility, and energy efficiency. The Department and its public, private, and academic partners received a \$4 million federal grant from the USDOT to perform research under the SafeTrip-21 Initiative. With cost share from the partners, the total value for this research is \$15 million.

This research brings innovation to the transportation field by building upon existing work that applies electronic information, navigation, and communications technologies to advance national transportation goals for reducing vehicle crashes, alleviating traffic congestion, enhancing transit use and ride sharing, enabling convenient electronic payment options, mitigating environmental impacts, and reducing unnecessary fuel consumption.

⁶ For further information on this subject, please contact the Department's Division of Research and Innovation.

The Department-led SafeTrip-21 research is in the following three projects:

- Networked Traveler – The objective of this project is to improve freeway safety by alerting drivers of slow or stopped traffic ahead of them. Statistics show that as much as half of the crashes on freeways are end-of-queue type crashes, where distracted or inattentive drivers come up suddenly on slower traffic and don't have time to stop before colliding with the cars in front of them. This project delivers an audio alert to drivers about one mile upstream from slow or stopped traffic ahead, using the smart phone that many drivers carry with them when they travel.
 - Mobile Millennium – The objective of this project is to determine whether traffic data (speed at a location) collected from GPS-equipped smart phones, that drivers carry with them when they travel, can be used to create accurate, timely, and reliable traveler information. This traffic data is collected in a manner that preserves the privacy of the driver, and then combined with other data points and processed into traveler information.
 - Smart Parking – The objective of this research is to determine if traveler information, delivered to drivers on their smart phone while they are en route, can entice them to switch travel modes from driving to riding on public transportation. When traffic along a major freeway corridor is heavily congested, using public transportation is often a better choice for travel. This project conveys parking availability, travel time for buses/trains compared to driving, and real-time bus/train arrival information to the driver to enable them to make an informed decision on travel mode choice.
2. Cooperative Intersection Collision Avoidance System (CICAS) –Twenty seven percent of all the accidents in the nation happen at intersections, causing 9,000 fatalities every year. CICAS has the potential to decrease accidents and improve public safety. CICAS provides a way to address unsafe left-turn problems at intersections without having to alter the signal phasing. Replacing a permissive left turn with a protected left turn typically leads to traffic flow reductions and might not be doable in some circumstances. The CICAS alert criteria will help drivers to avoid unsafe encounters and may even increase intersection capacity by helping drivers better distinguish acceptable turning gaps.

The Department received a \$3.5 million federal grant from the FHWA to increase safety at California intersections by applying advanced Intelligent Transportation System (ITS) technologies. The FHWA released the last \$732,000 for the remaining work to be completed by the end of FFY 2010. The goal is to assess the technical feasibility of implementing a CICAS system. The primary output of this phase will be a feasibility report with recommendations on the next steps for CICAS. Upon successful completion of this project, the FHWA may release more funds for a full scale field operational test.

With successful CICAS implementation, it will:

- Improve drivers' assessments of traffic situations by providing them with better information about the presence and approach speed of opposing traffic.
 - Discourage drivers from making unsafe left turns with inadequate gaps in the opposing traffic.
 - Alert drivers to the presence of other road users, such as pedestrians or bicyclists, on the cross walks, while negotiating a left turn.
 - Provide left-turning drivers with better information on whether or not an oncoming vehicle is going to stop during a signal phase transition, and continue to alert the left-turning driver if the oncoming vehicle might violate the red light shortly after the phase transition.
 - Reduce the number of safe gaps in opposing traffic that are rejected by left-turning drivers.
3. Mobile Work Zone Protection System (Balsi Beam) – Maintenance and construction crews working on the highway are usually protected by a shadow truck positioned at the beginning of the work zone and plastic traffic cones along the lane line. Errant vehicles can enter the work zone by driving over the cones thus injuring workers. To protect its maintenance workers, the Department designed and built the Balsi Beam. It is a mobile work zone protection system designed to protect highway workers.

In 2008, the Department of Finance approved a Budget Change Proposal to purchase three Balsi Beams and three ArmorGuard systems manufactured by Barrier Systems, Inc. The Department of Finance requested that the ArmorGuard system be evaluated against the Balsi Beam system.

The evaluation is being conducted by the Advanced Highway Maintenance and Construction Technology Research Center at University of California, Davis. Based on the current evaluation results, the ArmorGuard has different applications and potential uses than the Balsi Beam, therefore these two products should not be compared in terms of functionality. The deployment of the ArmorGuard system requires the closure of three full lanes and more than 45 minutes to setup as well as to remove the barriers. Analysis of work zone accident data in the context of deployment guidelines suggests that this is impractical in terms of space, time, and operator expertise for many maintenance tasks.

ArmorGuard barriers deflect up to six feet or more upon impact by a vehicle, so workers cannot work close to the barrier. This limits the application of the ArmorGuard system for worker protection.

These results will be updated as more evaluations are conducted and more data is obtained and analyzed from accident and injury reports.

4. Augmented Speed Enforcement – The Department proposed an innovative safety program consistent with the objectives of the FHWA sponsored Rural Safety Innovation Program (RSIP) to reduce speed-related crashes with coordinated speed management systems in work zones. This project will be a joint effort between the Western Transportation Institute (WTI) at Montana State University and the Partners for Advanced Transit and Highways (PATH) and the Transportation Sustainability Research Center at the University of California, Berkeley.

The vision for this project is to integrate four components – education, engineering, enforcement, and emergency medical services – to actively counter a high crash rate related to speeding on rural highways. This system is differentiated from Automated Speed Enforcement (ASE) by using real time information about speed violators to support on road enforcement actions by the California Highway Patrol. The core issue of this project will be to investigate whether the deployment of an ASE system will change driver behavior and reduce crash rates. The system developed and lessons learned in this project could then be used to prepare for wide-scale deployment in a speed safety program that targets all forms of speeding along rural highways.

This project is fully funded by the FHWA and the Department won a \$1.5 million award for this research.

5. Pothole Patching Equipment to Reduce Worker Exposure to Traffic – Repair of damaged pavement such as spalling concrete or potholes is an ongoing activity and typically performed with traffic in adjacent lanes. This exposure to traffic increases the potential for accidents and injuries involving workers. Reduced exposure can be achieved by changing procedures or utilizing automated equipment. After an extensive search of available technologies, a unique pothole patching truck was discovered that uses normal pavement materials (hot or cold asphalt concrete) and a compacting roller. This truck performs the entire operation with the operator in the cab; no workers are required on foot. The truck was acquired in summer 2009, and training was provided to District 3 Maintenance crews in fall 2009. Currently, the machine is in the initial field-testing stage with District 3 Maintenance crews.
6. Real-Time Global Positioning Satellite Signals for Winter Maintenance Vehicles – Real-time global positioning satellite (GPS) information is being evaluated to help keep Interstate routes open during heavy winter snow events. Snowplow truck drivers are hampered by long periods of low visibility due to snow conditions. Providing accurate location information to the drivers during heavy snow events provides a level of confidence that is otherwise not available. For example, a real-time GPS system could indicate how far the plow blade is from a guardrail or in what lane the plow truck is driving. It would also help locate turnouts or other landmarks that may be difficult to observe and assist workers new to the area.

B. Mobility

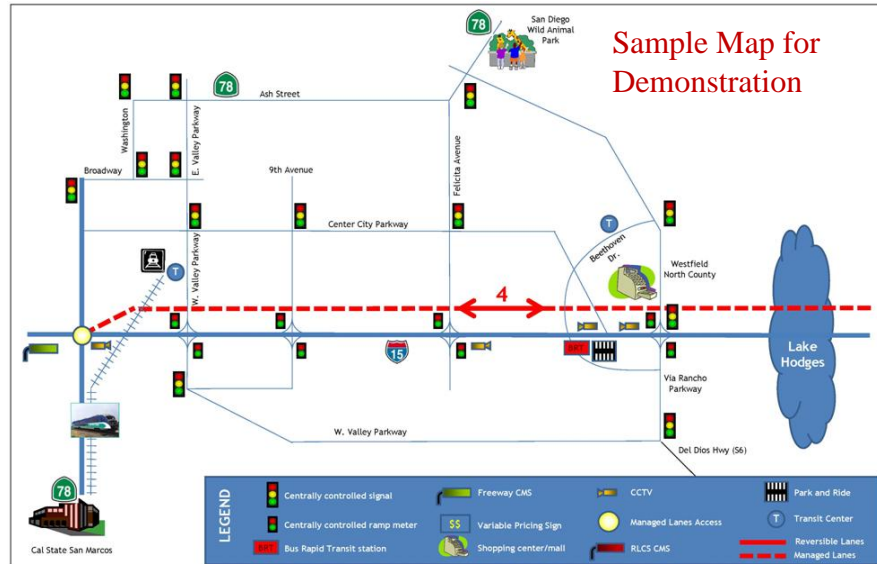
The Department is conducting research projects to increase mobility for all travelers. Additional benefits of these projects being researched are improvements in air quality and energy efficiency. Examples are:

1. Integrated Corridor Management – Integrated Corridor Management (ICM) is the coordination of individual network operations between parallel facilities that create an interconnected system capable of cross network travel management. ICM will help manage the whole system, thus improving mobility and energy efficiency. ICM will enable the independent systems and their cross-network linkages to be operated in a more coordinated and integrated manner, resulting in significantly improved operations across the corridor.

ICM involves operational, institutional, and technical integration in order to achieve integrated management of multimodal transportation systems along corridors in metropolitan areas. Its goal is to provide the institutional guidance, operational capabilities, and ITS technical methods needed for effective ICM Systems.

- Operational integration may be viewed as the implementation of multi-agency transportation management strategies, often in real-time, that promote information sharing and cross-network coordination and operations among the various transportation networks in the corridor, and facilitate management of the total capacity and demand of the corridor.
- Institutional integration involves the coordination and collaboration between various agencies and jurisdictions (network owners) in support of ICM, including the distribution of specific operational responsibilities and the sharing of control functions in a manner that transcends institutional boundaries.
- Technical integration provides the means (e.g., communication links between agencies, system interfaces, and the associated standards) by which information and system operations and control functions can be effectively shared and distributed among networks and their respective transportation management systems, and by which the impacts of operational decisions can be immediately viewed and evaluated by the affected agencies.

The San Diego Association of Governments (SANDAG) was the lead agency for a corridor demonstration project, in partnership with the Department, the city of San Diego, the city of Escondido, the city of Poway, the Metropolitan Transit System, and the North County Transit District. Interstate 15 corridor was chosen by the FHWA as a site for the demonstration of ICM strategies. SANDAG and its partnering agencies will contribute \$2.2 million for a total of \$10.9 million project. For more information please visit: http://www.its.dot.gov/icms/pioneer_sdiego.htm



2. Integrated Land Use/Economic/Transportation Modeling – This research project studies the feasibility, costs, and benefits of developing and implementing an integrated model to better support decision making and policy formulation pertaining to California transportation, demographic, land use, and economic trends, policies, programs and projects. The Department has contracted with UC Davis to test the feasibility and applicability of a geographically-based integrated statewide model. The UC Davis Urban Land Use and Transportation Center, in collaboration with the Department, have assembled a public-private partnership to fund and participate in the development of a full production version of the integrated model. This integrated model will help assess various infrastructure investment scenarios and policy options.
3. Rapid Rehabilitation Software Tool – Rapid Rehabilitation (Rapid Rehab) previously named CA4PRS, Construction Analysis for Pavement Rehabilitation Strategies) is a schedule and traffic analysis software that helps planners and designers select effective, economical pavement rehabilitation strategies. The software's scheduling module estimates highway project duration (total number of closures), incorporating alternative strategies for pavement designs, lane-closure tactics, and contractor logistics. Rapid Rehab's traffic module quantifies the impact of construction work zone closures on the traveling public in terms of road user cost and time spent in queue.

Rapid Rehab, used during the planning and design stages of any highway project development, helps balance schedule (construction production), inconvenience (traffic delay), and affordability (agency budget). This would help transportation agencies optimize construction schedules, providing savings in personnel and construction costs, and reduce overall road user delay caused by construction closures. Rapid Rehab yields additional benefits when its results are integrated with traffic simulation modeling tools (such as Paramics used by several Department districts). This integration helps in quantifying the impact of work zone lane closures to the whole highway network, including local arterials and neighboring freeways.

Use of this software has been demonstrated to save approximately \$20 million by reducing overall traffic delays caused by construction, and avoiding costly mistakes in construction productivity estimation as compared to proposed initial designs. Plans are underway for its use in District's 1, 3, and 4 on upcoming rehabilitation and widening projects.

4. Efficient Deployment of Advanced Public Transportation Systems –

This research brings the benefits of ITS to small-and medium-sized transit properties at a lower lifecycle cost. Efficient Deployment of Advanced Public Transportation Systems (EDAPTS) facilitates small transit system access to:

- Real time bus location and schedule using GPS.
- Silent alarm mode for drivers to advise the dispatcher of life-threatening situations.
- High-visibility solar-powered dynamic message signs to give waiting passengers bus arrival information.
- The ability to utilize low-cost wireless data streams or unused voice radio channel capacity to establish digital data links between buses and dispatch center.

The current EDAPTS solutions use a central database computer to collect actual schedule and performance data, and low-cost communication links to remotely located, solar powered dynamic message signs at bus stops. The original research test system was adopted by the city of San Luis Obispo in 2002 and remained operational through 2009. It has received high praise by transit riders, bus drivers, transit agency managers, and public officials. It was so successful in demonstrating the benefits of ITS to the city that it has now been replaced with a new, updated commercial system. An updated EDAPTS demonstration test system has been installed on the Bronco Express campus bus service at California State Polytechnic University at Pomona, and is now in daily operation. This system utilizes a commercially available product that has Americans with Disabilities Act compliant solar signs and uses the latest off-the-shelf ITS components. This research system demonstrates the flexibility, extensibility, and low-budget features of the EDAPTS approach to procuring small transit ITS solution.

C. Air Quality

The Department is conducting air quality research studies to understand the air quality impacts of maintenance and operations, improve the quality of project-specific air quality analysis, and to develop appropriate mitigation measures. Examples are:

1. Hydrogen Highway Network – On April 20, 2004, the Governor signed Executive Order S-7-04, designating California's 21 Interstate freeways as the California Hydrogen Highway (H2) network. This order mandates the planning and building of a network of hydrogen fueling stations along these roadways, and in the urban areas where they connect. The goal established was by 2010, every Californian will have access to hydrogen-fuel that is increasingly produced from clean, renewable sources.

In June 2004, the Department entered into a collaborative research effort with the University of California, Davis, Institute of Transportation Studies' Hydrogen Pathways Program, precursor to the current Sustainable Transportation Energy Pathways (STEPS) Program, to meet the challenges of developing the hydrogen highway network. The Hydrogen Pathways Program at UC Davis makes available to the Department research-based knowledge, experience, and recommendations on site development, transport, operation, maintenance, and safety of hydrogen fueling stations. Sites will initially include locations in the South Coast Air Quality Management District, remote off-grid maintenance facilities, and other locations yet to be determined.

With public and private partners, the Department has conducted "ride and drive" clinics in Sacramento and the San Francisco Bay Area to survey participants with regard to their first-hand experiences with hydrogen fuel cell vehicle technology and fueling infrastructure. The results of this study will help make key policy decisions related to infrastructure development under the Hydrogen Highways Initiative and for fleet management.

The Clean Hydrogen for Transportation Applications project is comprised of hydrogen-related research teams from the private sector, federal agencies, and academia. The project will carry out hydrogen-related research and studies that support the Governor's H2 network mandate, as well as determine social and financial viability of hydrogen as an alternative transportation fuel. Research-based recommendations include planning, market analysis, economic viability, and environmental conformity for stationary and mobile fueling sites. The first product was a presentation of the Governor's H2 scenarios, including fuel dispensing options, associated costs, regulatory/safety concerns, and citing options including the new Department Shop 7 in Los Angeles. In addition, the Department participated in the Governor's H2 Blueprint/Rollout Strategy Topic Team Activities headed up by the California Air Resources Board (CARB) and the California Environmental Protection Agency (Cal/EPA).

- In 2005, the Department's Energy Conservation Program was the first State department to buy a 1000-watt hydrogen fuel cell system. The fuel cell system's primary use is to demonstrate the technology and be available for limited application field-testing.
 - In 2005, the Department also received the loan of two fuel cell powered vehicles. The Division of Equipment has the lead responsibility for field-testing these vehicles.
 - In 2006, the Department's Energy Conservation Program entered into a contract with the UC Berkeley Institute of Transportation Studies to research non-carbon/sulfur feed stocks for hydrogen fuel cell systems.
 - In 2007, the Department partnered with the Schatz Energy Research Center at Humboldt State University, which designed and constructed a hydrogen fueling station at the university. The fueling station project, located along the more remote north coast, is continuing to operate successfully and adds to the current research on hydrogen vehicles and fueling. Follow-up tasks are currently being considered for future funding.
2. The Department has also sponsored a four-year project with the Institute of Transportation Studies at UC Davis for the Sustainable Transportation Energy Pathways (STEPS) Program. This comprehensive, multi-disciplinary effort will provide research and outreach to address the technical, operational, and logistics issues related to the transition to an alternative fuel-based economy, including hydrogen. This sponsorship project is continuing through FY 2010-11.
 3. Emissions from construction equipment engines are becoming an increasingly important issue, particularly in urban areas that are not meeting air quality standards. Studies included measurements of equipment such as motor graders, front-end loaders, and bulldozers in-use operating conditions. Emissions data are also being gathered in order to develop a model that will determine emissions from different pieces of construction equipment or for construction projects as a whole. This project is expected to be completed by December 2010.
 4. The Department is developing processes to address Climate Change/Greenhouse Gas Emission reductions as required by AB 32 legislation. Through the development of internal expert groups and international collaboration efforts, the Department is developing a policy framework for research and evaluation of connections between mobility and climate change impacts, including adaptation/mitigation strategies. Further, the Department has been working with the UC Berkeley to develop tools for planners and decisions makers to focus on the changes needed to minimize carbon emissions.
 - Creation of the Climate Change Advisory Group has assisted the Department in developing a roadmap of research projects addressing greenhouse gas emissions

reductions as well as developing policies that will lead the Department to more focused efforts regarding AB 32 and SB 375 mandates.

- A partnership between the Department and Netherlands Climate Change Research Collaboration will be critical to improve the quality of research on current and future projects. This includes the sharing of research “roadmaps” and discussions of internal and associated government partners necessary for climate change evaluations and actions.

D. Energy Efficiency

The Department recognizes the significance of energy-efficient transportation systems and operations. Making the transportation sector more energy efficient with diverse energy infrastructure is an important step toward a cleaner environment and lower dependency on fossil fuels. Cal/EPA, CARB, and the California Energy Commission (CEC), along with a number of other agencies support the research and development of alternative fuels and vehicles.

Additionally, the Department works with other state, regional and local agencies to promote environmental sustainability and implements policies conducive to smart growth, livable communities and enhanced transit services, including car sharing and ridesharing. The Department is a member of the Governor’s Climate Action Team (CAT) headed by Cal/EPA and is committed to transportation strategies outlined in the CAT report to reduce transportation fuel consumption and greenhouse gas emissions.

The Department, through the Governor’s Strategic Growth Plan and Traffic Congestion Relief program, seeks to reduce emissions by minimizing travel demand and congestion through improved highway operations, such as application of ITS, like traveler information, traffic control, electronic toll collection on bridges and ramp metering. The Department’s “Greening the Fleet” initiative uses viable, emerging technologies to reduce mobile source emissions. Solar panels have replaced fossil fuel powered accessories, such as message signs and lighting. These efforts will continue under the Department’s stewardship goals to preserve and enhance California’s resource and assets and comply with numerous air quality mandates that affect the Department’s fleet.

The Department is conducting research projects on improving energy efficiency for both private vehicle owners and the public sector in order to decrease the amount of fuel consumed and lowering transportation costs. An added benefit of increasing energy efficiency is an improvement in air quality.

ALTERNATIVES TO FOSSIL FUELS⁷

Since the mid-1970s, the Department has been a leader in reducing its rate of consumption of fossil fuels, while at the same time increasing the size and complexity of the State's transportation infrastructure. Finding alternative energy sources is an element of this effort. Photovoltaic and wind power generation, hydrogen fuel cell and biomass power generation opportunities are being identified and developed into potential projects. Areas where these alternative energy sources can be applied include:

- Communication relay stations.
- Roadside emergency call boxes.
- Off-grid facility power.
- "Park and Ride" parking lot lighting.
- Remote-site flashing amber warning beacons.
- Bridge-mounted wind generation prototype development.
- Portable, trailer mounted, changeable message signs and arrow-boards.
- On-site power generation.
- On-site hydrogen generation or storage for use in fuel-cell technologies.

These types of projects are best applied after the conservation opportunities within the Department are implemented. As an integrated solution, non-fossil fueled power production, coupled with conservation measures, will help to reduce the need for fossil fueled energy in California.

The areas that have been identified for modification under current conservation efforts include:

- Turn off energy-consuming equipment when not in use, automatically or manually.
- Conducted computer energy management and automated avoided energy consumption tracking product study in 2007. Statewide deployment of project is approximately 50 percent complete with final completion scheduled in 2011.
- Replace less efficient equipment with the most energy-efficient. Products, such as, the Department's current adoption of new roadway lighting performance standards for light emitting diode lighting technologies. This technology allows for automated control of lighting for roadways and exterior lighting devices so the systems only operate when the need is present.
- Size equipment to meet loads, and where possible, install equipment that can vary output to meet variable loading situations.
- Install responsive automated control systems for facility environmental system.
- Develop conservation action plans that treat each facility's energy system elements as one integrated, interrelated system.
- Continue employee awareness programs that promote conservation at the work place and at home.

⁷ For further information on this subject, please contact the Department's Division of Business, Facilities, and Security.

- Coordinate with the Department of Finance and other government agencies to develop and implement a standardized method of total life cycle cost analysis in all energy-related state decision making.
- Analyze energy-related programs, hydrogen-economy infrastructure development, and other energy-related projects.
- Coordinate with the other state departments to develop sustainable design elements for state facilities. The Department has adopted Leadership in Energy and Environmental Design (LEED) Silver elements or better for new construction and facility rehabilitation along with other currently enforced codes.
- Working with the Department of General Services and the State Energy Commission, the Department is partnering to identify and implement energy conservation measures at qualifying building sites under 50,000 square feet, with project funding coming from the American Recovery and Reinvestment Act of 2009 (Recovery Act) funds administered by the CEC. Project completion is expected by 2011.
- Applied and was authorized to fund, design, and implement over 70 solar electric projects through the 2006 Federal Clean Renewable Energy Bond Program. Completion of those projects is expected by the end of 2010. Linking the solar projects with on-site Recovery Act funded conservation activities could lead to Annual Net Utility Grid Neutral facilities.
- Implement a vehicle idling policy to reduce fuel consumption in vehicles during inactive operation.

Using 1995 as the base year, as defined in Executive Order W-83-94, the Department has increased its rate of energy conservation to 121 gigawatt-hours per year with an estimated 85 gigawatt-hours of additional annual savings potential in conservation measures under development or study. Current electricity grid reduction impact by the Department's efforts is up to 20 gigawatts, with an additional potential of 18 gigawatts currently under development or study. According to US EPA, the 121 gigawatt-hr annual avoided power consumption translates to about 53,119 tons (48,180 metric tons) of CO₂ greenhouse gas reduction.

An energy study undertaken in FY 2002–03 demonstrated it takes approximately 1.7 barrels of crude oil to generate 1,000 kilowatt (KWH) of electricity. The Department's conservation efforts in FY 2002-03 reduced fossil fuel consumption by about 205,700 barrels of oil. While additional efforts are underway to measure energy conservation, this formula is useful in assessing current conservation programs.

With the issuance of Executive Orders S-12-04, S-20-04, S-03-05 and S-06-06, additional authority to increase the outreach of existing energy and environmental programs are in the planning stages for implementation within the next five to ten years. Most departmental energy conservation goals should be attainable by 2015.

In FY 2006-07, the Department joined the California Climate Action Registry (CCAR), and became a certified member in 2009 by having its energy baseline certified by a third party engineering firm. This includes benchmarking of all departmental energy usage and conservation activities past, present and future. This also includes usage in facilities, roadway electrical systems, fleet and equipment. Re-certifying is required every other year.

A. Alternative-Fueled Vehicles Research

The Department, along with a number of other governmental agencies and academia, has experimented with the development of non-gasoline and diesel powered vehicles. For the most part, these alternative fuel vehicles still require some fossil fuel in some form as their energy source. Research is continuing into a non-fossil fuel powered transportation system including zero-pollution and electric vehicles. To be truly non-fossil fuel reliant, electricity used to charge electric vehicles must come from non-fossil fueled electric power plants. While it is currently possible to power a vehicle from non-fossil fuel sources, the short- and long-term fueling, servicing and maintenance infrastructures do not exist. Without the support infrastructure in place, the impact and use of the technology will remain limited. Profit incentives must be in place to support the development of this market place in the long run. The public sector must be an active partner with the private sector to develop this new industry and the support infrastructure.

For additional information please link to the Department's Energy Conservation Program Web site at: <http://www.dot.ca.gov/hq/energy/>.

B. Alternative Fuels and Petroleum Displacement⁸

The Department has invested in a variety of alternative-fueled vehicles in its vehicle fleet. It is expected that usage of alternative-fueled vehicles that run on E85 (85 percent ethanol and 15 percent unleaded gasoline), CNG, propane, or biodiesel result in a quantitative reduction in carbon emissions, better fuel economy, and general support for energy independence. However, it has been difficult to determine how much these vehicles are actually using alternative fuels, especially where they have bi-fuel capability. While a general understanding of fuel consumption can be gained through fuel sales data, those performance indicators are somewhat limited.

1. The Department's DRI, in partnership with the Division of Equipment and the UC, Riverside, College of Engineering – Center for Environmental Research and Technology, (CE-CERT), initiated a pilot project to monitor and track the use of Ethanol (E85) in the Department's Flexi Fuel fleet (vehicles that can alternatively run on different fuels). A prototype system was designed, developed, and deployed in ten instrumented vehicles. Five of these vehicles were deployed in the Department's District 3 and five in District 11. The system server is located at UC Riverside and can be accessed by authorized personnel 24 hours a day via the Internet. After developing the on-board hardware and system server, the hardware was placed in the vehicles and the pilot study was conducted over six months.

Based on the performance of the system, the study is being expanded to include enhancements to the overall system architecture, the development of universal protocols, and a larger scale of deployment. The Department currently operates

⁸ For further information on this subject, please contact the Department's Division of Equipment.

more than 650 flexible fuel (E85) vehicles. The system will collect data on fuel usage (percent of E85 being burned) along with information on the locations where the vehicle is refueled. The Department operates 12 E85 fueling sites located throughout the state, with six more sites being considered. Location of E85 vehicles are clustered around the fuel sites to maximize E85 fuel use.

This GPS-based system will allow supervisors and managers to monitor fuel usage in ensuring that the vehicles are operated on E85 to the extent feasible and available. This research is also expected to result in development of a plan to implement the system throughout the Department's flexible fuel vehicle fleet. It is anticipated that there will be sufficient refueling stations throughout California to maximize and enhance E85 usage during the time frame of the study.

The Department has also completed a biodiesel pilot program with the UC, Riverside. Over 10,000 gallons of B20 biodiesel fuel (20 percent biodiesel-80 percent diesel fuel) were used during the study. The Department has utilized the experience from this study to implement biodiesel in its bulk fuel sites. Approximately 90 percent of the Department's bulk fuel sites are dispensing biodiesel fuel. Also, the Department operates CNG fueled sweepers and heavy duty trucks primarily in the South Coast Air Quality Management District. These efforts will promote the state's emissions and petroleum reduction goals.

2. Alternative Fuel Fleet Monitoring System – DRI, in partnership with the Division of Equipment, is working on a telemetry research project to measure fuel consumption rates for various vehicle types in order to develop a means to conserve the amount of fuel used by its maintenance fleet. Quantifying fuel used while engaged in a job versus traveling to the job site will provide opportunities for gaining tax credits for fuel consumed during off-road activities by licensed on-road vehicles. Also, quantifying fuel used while idling and while powering auxiliary work systems of stationary vehicles could result in the efficient use of idle shut down systems.
3. An additional partnership has been developed between UC, Davis, a private industry equipment manufacturer, and the Department to install hardware in a pilot group of 30 vehicles that includes a microprocessor-based data collection device. The product provides real-time location information via GPS, as well as engine operating parameters, including real time fuel consumption, through an interface with the vehicle manufacturer's database. Activation and deactivation of auxiliary work systems are monitored through custom hardware interfaces. All information is sent to a database via integrated wireless cellular communications, making it available for analysis by the researchers and practitioners involved in the project. Pending a presentation of findings to Division of Equipment management, more units may be installed in fleet vehicles, and the information they provide could be used by fleet managers.

C. Alternative Fuels and Vehicle Technologies Market

The extent of market penetration and marketing success of alternative fuels and vehicle technologies will, in large part, depend on a statewide service and maintenance infrastructure. There are approximately 400 public charging stations in California for electric vehicles and many private businesses are also providing charging facilities for their employees and customers. A systematic expansion of a support infrastructure for alternative vehicles is necessary for zero emission vehicles and partial zero emission vehicles to gain support.

The commercial market for alternative fuels and vehicle technologies (i.e., hybrid) is improving and will have a more sustainable and important role in California's transportation market. Changes in transportation energy markets will have a wide range of system implications and require continued research and evaluation. As an example, transportation financing is directly impacted by the transportation fuel tax structure. It may be necessary to modify the fuel tax structure to reflect institutional and market changes in the future.

In 2009, Green Technology, a nonprofit initiative designed to help government efforts toward sustainability, honored the Department with its 2009 Green California Leadership Award for developing an alternative fuel project to reduce greenhouse gas emissions in Department operations. The project maximizes the Department's use of alternative fuels, increases the number of flex-fuel and green vehicles in the fleet, and reduces overall fuel consumption through conservation practices.